A COMPARISON OF FEMALES IN LEVELS I, II AND III AS PER THE INFLUENCE OF MENTORSHIP ON THEIR ATTITUDES TOWARDS SCIENCE AND THEIR CAREER ASPIRATIONS

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by

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ABSTRACT

The purposes of this study were to examine the influence of mentoring; the attitudes towards science, and the occupational plans of adolescent females in Levels I, II and III in an urban high school in Newfoundland and Labrador.

Individual questionnaires were administered to 121 students attending one urban high school. The data from 75 returned questionnaires were analyzed using the statistical program, SPSS. Descriptive statistics, including percentages and frequencies, along with chi-squared analysis were used to analyze the data.

The findings indicated that 75% of the young women in the study could identify one or more mentors in their lives. There were no significant differences between those who identified mentors and those who did not on variables of attitudes towards self in the present or future, self-esteem, occupational plans, attitudes towards science, or beliefs regarding women in science occupations. Some of the findings on young women's self-esteem and attitudes towards science and science-related occupations were not consistent with findings reported in earlier studies.

Most of the young women in the study believed that significant adults in their lives had influenced their career-related decisions and supported the notion that schools should encourage mentoring. The majority reported having good self-esteem and felt confident when voicing their opinions. Most of the women surveyed were confident in their abilities in the sciences and believed they would be successful in school.

It is recommended that parents become informed of the impact they and other significant adults have on the career decisions of their daughters. It is also recommended that schools attempt to promote mentoring for young women and to guide young women in their career planning, ensuring that occupations in science are presented as viable and possible options.

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Secondly, I wish to thank Gerry White for his help in analyzing and organizing the data.

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Chapter 1

Introduction

This study has three objectives: to study the influence of mentoring on adolescent females; to explore the attitudes that adolescent females have towards science and to examine the occupational plans of adolescent females enrolled in an urban high school. As girls transition into adulthood, they face many challenges and make important discoveries about themselves. It is a time when critical decisions towards future careers are made and a time when potential occupations are considered or eliminated from the realm of possibilities. This researcher seeks to explore the attitudes and expectations of young women with respect to science and science-related occupations. This study examined the impact naturally occurring mentors have on the lives of the young women, including their attitudes, self-concept and occupational plans.

Statement of Purpose

After decades of continued interventions with young women on decisions pertaining to occupational selection, there still exists gaps between men and women in science related occupations. Males continue to exceed females in science occupations. This study attempted to explore the impact mentors have on young women's attitudes toward pursuing occupations in these traditionally male dominated areas, to contribute to

the body of knowledge of women's career development and to understand factors that influence young women's occupational choices.

Significance of the Study

The transition from girl to woman is a pivotal time for females. It is a time of important discoveries about the self, realizations about the present and plans for the future. For most young women it is a time when goals and aspirations about future careers are made. Young women need support and encouragement as they make significant decisions about their careers. The adults who assist and nurture the career development of young women must ensure that occupations in science are presented as potential options.

The under-representation of women in the sciences has been a chronic problem in North America for decades. In recent years there has been a fair amount of interest in the problem and many studies (Astin, 1990; Baker and Leary, 1995; Betz, 1997; Evans, Whigham and Wang, 1995) have examined possible remedies (Betz, 1997). There remains, however, a substantial gap in the proportion of women to men who have pursued occupations in the sciences.

Betz (1997) asserted that too few females have chosen to pursue occupations in science and that of those who did study science, even fewer were retained at the graduate level. The result, in the United States, is that in a workforce where women constituted 45% of the workers, they made up only 30% of all scientists and only 4% of all engineers. In 1997, women constituted 58% of Canadian University graduates, but only

comprised 20% of the graduates from engineering and applied science programs (Statistics Canada, 1999). Betz suggested that many females might avoid occupations in science because of stereotypes they have of scientists and the work that they do. A mentorship program may help to correct these stereotypes and encourage more young women to explore occupations in science. Betz (1997) suggested that female role models might challenge girls' concepts of scientists.

In 1990, the Ministry of Supply and Services, Government of Canada, reported that the percentage of women in the Canadian workforce rose from 33% in 1970 to 44% in 1988. The majority of women were concentrated in non-unionized service industries and in lower paying occupations. In 1988, women formed 80% of clerical workers, 57% of all service industry workers and 46% of sales workers. The frequency of males across occupations tended to be more evenly distributed. Women tended, and still do, to be over-represented in the more "traditional" fields of teaching and health, primarily nursing. In 1989 in Newfoundland, 62% of women employed worked in clerical, service and sales occupations. The clerical field employed 29% of all working females but only 5% of working males (Ministry of Supply and Services, Canada, 1990).

In their survey of grade 12 students in Newfoundland and Labrador, Sharpe and Spain (1991) observed this:

> "First, traditional gender-related occupational choices were still very much in evidence, despite some trends toward greater female participation in the traditionally male bastions of construction, transportation, and product fabrication. In addition, there appears to be an avoidance of female choice in the areas of engineering and math". (p.56).

Statistics compiled by the Department of Education in Newfoundland and Labrador (1991) support the findings of Sharpe and Spain. In 1988-89, the enrollment in engineering and applied sciences throughout the province was 15.3% female and 84.6% male. The total enrollment of full-time undergraduate students at Memorial University of Newfoundland in the Fall of 1999 was 11 929 59% of the students were female and 41 % were male. These numbers, however, were not evenly distributed across the various disciplines. The percentage of female students enrolled in the faculty of engineering in 1999 was 21%; while 90% of nursing students, 86% of those studying social work and 80% of education students were female. These statistics indicate that women continue to be over-represented in the traditionally female fields of nursing, social work and education, while maintaining under-representation in the faculty of engineering (Memorial University of Newfoundland, 1999).

Human relationships involving mentorship date back to Homer's *Odyssey*, when the son of Odysseus, Telemachus, was encouraged under the mentorship of Athena, the Goddess of Wisdom. Just as Athena nurtured Telemachus to become a leader, women today provide encouragement and impart wisdom to protegees (Bizzari, 1995; Didion, 1995).

Today, mentoring is found in many disciplines including health, business, science and education. Its roots are in the arts and humanities with some notable historical mentoring relationships. Lorenzo de Medici was mentor to Michelangelo, Verrocchio to Leonardo da Vinci, Josef Breuer to Sigmund Freud and Franz Boas to Margaret Mead (Yoder, 1990).

Mentoring can be described as an exclusive, often intense, relationship between two individuals. The mentor imparts knowledge, coaching, encouragement and emotional support to the protegee. The benefits to the protegee are obvious, but mentorship is a reciprocal relationship, and the mentors, while giving much of themselves to the protegee, receive many benefits in return. Mentors often develop social networks, exchange information and receive assistance from protegees (Sandler, 1995). Many adults in the role of a mentor have found that while assisting adolescent protegees with problems related to personal, academic and professional issues, they have reinstated in themselves the positive changes they are modeling and make progress with their own goals (Rhodes and Davis, 1996). Researchers are also beginning to discover that experiencing mutual benefits in the mentor-protegee relationship is an important element in the success of the relationship (Rhodes and Davis, 1996; Sullivan, 1996).

The definition of mentor often seems to change with the particular situation in which the relationship appears. Generally, mentoring is an agreed-upon activity in which an individual, known as the mentor, helps to guide an individual, which for the purposes of this paper will be known as the protegee. Together, they attempt to navigate along a chosen educational, career or personal path.

Rhodes and Davis (1996) also examined the relationship between natural mentors and occupational outcomes. They reported that mentors can often act as role models for young women and offer realistic information about career opportunities. Klaw and Rhodes (1995) found that African American adolescents who identified natural mentors were "more likely to be engaged in activities related to their career goals". Mentors were a source of encouragement towards further education and career exploration.

Mentorship programs can accomplish several goals. First, they can raise girls' awareness of occupational opportunities. Second, mentors can provide concrete evidence of careers that they can aspire to while still maintaining a sense of self. Third, a mentorship relationship can open and sustain a dialogue between the girl and her mentor. This can provide support and encouragement for a girl who may be lacking this in their home environment. (Marlow and Marlow, 1996). In general terms, a mentoring relationship can also provide the protegee with coaching, protection and challenge, as well as the psychological benefits of acceptance, counseling, emotional support and role modeling (Baugh, Lankau and Scandura, 1996). Mentoring may be particularly useful in the fields of science and engineering where women and members of minorities enter these areas far less frequently than do their male counterparts (Betz, 1997).

Betz (1997) discussed career development in terms of two phases – choice and implementation. Choice, Betz wrote, is the occupation an individual desires to pursue and implementation the educational path that the individual takes to make their choice a reality. Betz suggested that too few women choose occupations in science and of those who do, many leave the field during the implementation phase (Betz, 1997).

Two obstacles exist on the road to implementation of one's occupational choice. Some individuals may be lacking in their preparation for a chosen occupation, while others may be deficient in their level of motivation. While women may perform as well, or better, than their male counterparts in high school science, many lack the math pre-requisites for majoring in science at the college level. Inadequate math preparation can acutely limit a woman's preparedness for an occupation in science (Betz, 1997).

Psychological obstacles may also limit the occupational choices of women for occupations in science. Girls may perceive occupations in science as being male dominated, cold or unenjoyable.

Social influences are another factor that inhibits girls from choosing and implementing science occupational choices. As girls grow up, they lose confidence in their ability to perform in science and math, although this belief is not substantiated by their actual performance (Baker and Leary, 1995; Betz, 1997).

Parents also have an influence on their daughter's decision to pursue a career in science. This may be particularly influential when one or both parents work in the field of science. Perhaps the girl's exposure to science through her parent(s) de-mystifies the field (Baker and Leary, 1995; Nevitte, Gibbons and Codding, 1988).

Betz (1997) proposed that low expectations of self-efficacy with respect to the field of science may create in girls' maladaptive cognitions. She applied Bandura's theory of career self-efficacy to her studies of the career decisions of women. Betz summarized Bandura's theory by stating that self-efficacy affects both occupational choice and implementation. Whether or not a person chooses a particular career path is greatly dependent on whether or not he/she believes that they are competent in the particular areas (Betz, 1997).

Baker and Leary (1995) suggested that schools may be a factor in the low numbers of girls who aspire to occupations in science. They cited several studies that indicated that girls received less experience with science equipment and activities than did boys. But these experiences alone are not enough to explain the gender gap in science occupations. Self-concept may be another factor. As girls mature, they begin to

lose confidence in their abilities to succeed at science and math (Baker and Leary, 1995; Betz, 1997).

Fox , Brody and Tobin (1979) evaluated the impact of early intervention programs developed to get more women into math and science by increasing the enrollment of bright females into math and changing attitudes about math and science occupations. Females who received career awareness treatments and exposure to female role models expressed higher levels of educational aspirations than did females receiving no treatment (Fox, Brody and Tobin, 1979).

Fox et. al (1979) suggested that an ideal career intervention would include occupational information that is easily accessed by the client and assessment materials and devices that clarify the clients vocational potential. Fox also indicated that individual and/or group activities that require the rehearsal of career plans or problems, counsellors, groups or peers that provide support, and a comprehensive cognitive structure that organizes information about the self and occupational alternatives would encourage more females to enroll in science and math programs.

Eccles (1986) believed that women, like men, selected their major life roles and activities from the variety of options that they deemed appropriate. It is the subjective meaning and interpretation of success and failure that determines an individual's perceptions of the task and not the objective outcomes themselves. Choice, wrote Eccles (1986), is an outcome of interest. Educational and occupational choices are guided by several factors. First, an individual's expectation for success on the perceived options affects their choices. Second, the relation of these options to short and long term goals as well as self-identity and basic psychological needs affects choices. Third, the choices

made by an individual are guided by an individual's gender roles. Finally, the potential costs of investing time in one activity rather than another affect choice.

Eccles (1986) further elaborated on the need to examine women's choice of occupations rather than their avoidance of occupations. This will provide a more positive perspective on women's achievement behaviour than is found in most explanations for sex differences in achievement.

Eccles (1986) reported finding that from grade 7 onward girls had lower confidence in their math abilities than their english and that girls had lower expectations for future successes in math than did their male counterparts. Parents, reported Eccles, thought math was harder for daughters than for sons, despite researchers finding equivalent grades for boys and girls. Parents rated advanced math courses as less important for daughters than for sons and english and history as more important for daughters. Eccles (1986) suggested that these findings proposed that males and females of approximately equivalent math ability had a different perception of the causes of success and failure in math. If females acquire different attributional patterns, beliefs and values for success at different occupations, and these patterns are associated with the gender role appropriateness of the career and one's other long range goals, then understanding these patterns can help to explain the preference for gender-appropriate careers.

Under-representation of women in the sciences has been a trend for decades. While there has been considerable interest in the issue in recent years, the gender gap still exists. Most of the research (American Association of University Women, 1992; Farenga and Joyce, 1998; Sadker and Sadker, 1994) that has been done in this area has focused on

male-female comparisons. Furthermore, many of the studies have set up a deficit model that favours boys; boys are adequately represented in the sciences – what is wrong with the girls? Feminist scholars (Baker and Leary, 1995; Brown and Gilligan, 1992) endorsed the renunciation of such a format of study, and instead, proposed that girls should be examined alone. This approach doesn't accept male behaviour as necessarily the norm. It allows findings to be explored from a girl's sociopsychological actuality. Girls' behaviours can be viewed from their point of view, taking into consideration their goals and needs (Baker and Leary, 1995). Brown and Gilligan (1992) suggested that conducting a study of girls only also reduces the risk of reducing the data to either/or categories that are too simple to capture the often complex findings.

The under-representation of women in science is clearly a significant issue and one that needs to be addressed. Many intervention programs aimed at encouraging young women to pursue non-traditional careers in science have been successful, while others have not (Sheppard, 1999). Much of the literature on mentoring indicated that such relationships could have positive effects on the lives of adolescent girls. It is possible that mentoring may be a plausible approach to assisting young women with their career exploration and in encouraging them to consider occupations in science. The specific research questions of this study will follow in the next section.

Research Questions

This study addressed the following research questions:

1. Are there significant differences among Level I, II and III females enrolled in science courses at an urban high school in their attitudes towards science?

2. Are there significant differences among Level I, II and III females enrolled in science courses at an urban high school as per students' plans to pursue an occupation in science or a science related field?

3. Are there significant differences among the females in urban high schools who identify mentors in their lives and those who do not identify mentors as per their attitudes towards self in the present?

4. Are there significant differences among the females in urban high schools who identify mentors in their lives and those who do not identify mentors as per their attitudes towards self in the future?

5. Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their self-esteem?

6. Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their plans to pursue an occupation in science?

7. Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their attitudes towards science?

8. Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their plans regarding career and family?

9. Are there significant differences among the perceptions of females in Levels I, II and III enrolled in science courses in urban high schools on the importance of the role of mentors in influencing career plans/aspirations?

10. Are there significant differences among the perceptions of females in Levels I, II and III enrolled in science courses in urban high schools in their attitudes towards schools encouraging mentoring?

11. Are there significant differences among Level I, II and III students enrolled in science courses in urban high school as per their beliefs about women in science occupations?

Limitations of the Study

As no follow-up of the sample was proposed, as part of this study, there was no way of knowing if what the students reported with respect to their future educational, occupational and family plans were realized. A second limitation is that of student interpretation of the questions and the care with which they selected their answers. This method of data collection posed problems that were beyond the control of the researcher of this study. Third, the study assumed that students understood the questions posed and answered honestly. Finally, the subject pool was limited to females enrolled in science courses in just one urban high school within the Province of Newfoundland and Labrador.

Definition of Terms

Career - the sum total of jobs, occupations and experiences, both paid and unpaid, that make up a person's life.

Career Aspirations - a particular educational or occupational goal that an individual strives to attain.

Mentor - an advisor and role model who imparts wisdom, support and guidance to another individual (the protegee) who is younger, less

experienced or less knowledgeable in the mentor's area of expertise.

Natural Mentor - A mentor who has not been formally assigned or paired with a protogee. These often include neighbors, non-parent relatives, teachers and coaches of the protegee.

Occupation - a set of skills and duties that is common to a number of different jobs in a related field.

Protegee - a person who is guided and helped in a particular area or aspect(s) of his/her life by a more experienced and knowledgeable individual (the mentor).

Self-concept - refers to "one's view of oneself, one's view of who one is and who one is not" (Gottfredson, 1981, pp. 546-547).

Self-esteem - the attitude of self-respect an individual has about his/her own appearance, abilities and competencies. The acceptance or rejection of others affects this construct.

Urban - communities with populations above 50 000.

Chapter 2

Introduction

In this chapter, theories of career development are presented. The empirical studies discussing the factors considered salient in the career development of women are included. This chapter also examines studies on women's involvement in the sciences and in science-related careers. An examination of the theoretical aspects of mentoring concludes the chapter.

Theories on the Career Development of Women

Frank Parsons' book, Choosing a Vocation, written in 1909, analyzed the career process of men and was one of the first books on career counselling. There have been several other theories put forth by psychologists since this time. Most of the theories developed prior to the 1980's were focused on the career evolvement of men (Betz and Fitzgerald, 1987), for example, Bandura (1977) and Holland (1966).

In the 1960's and later more researchers began to focus on the career development of women, initially examining women's career orientation – whether or not women would pursue a career or be a home-maker. Eventually research, (Astin, 1984; Farmer, 1985; Gilligan, 1982) began to explore the reasons women choose various careers.

The career orientation of women was the focus of some of the earliest studies of women's career development. Studies that focused on homemaking versus career

continued into the 1960's and 1970's. For example, Rand and Miller (1972) and Rossi (1976) began to examine the variables affecting the career orientation of women. Rossi also began to investigate women who chose to enter non-traditional careers. Eyde (1970) was among the first to begin to define career orientation as a variable that was affected by several facets of a woman's life.

Super (1954, 1957, 1980) was one of the first theorists to consider the career development of women. In the 1950's he explored various aspects of career development and recognized that men and women differed in their development of career. Super was also focused on three main areas important to the study of career development: situation, personal determinants and self-concept.

Super (1957) emphasized the intimate relationship between career development and personal development. He believed that the process of career development was continuous throughout the life cycle and was generally irreversible. Individuals are influenced by both internal and external determinants in each stage of life. Determinants are one of two types – situational and personal – and affect the career path chosen by the individual. Situational determinants include how a person is influenced by personal and family relationships, his/her job, school and community. Personal determinants include the individual's wants, needs, attitudes, self-concept, interests and intelligence.

Super (1980) suggested that a person's career development was the result of an interaction between an individual's environment and his/her personal variables. Super developed 10 major propositions, that later expanded to 14, to provide a framework for his research and study (Herr and Cramer, 1996).

In Super's (1980) later research he developed a Life-Career Rainbow to portray how various roles emanate and interact across the lifespan. Super (1980) proposed that individuals play various roles throughout their lives, often simultaneously. The concurrent roles can cause conflict for individuals, thus requiring them to strike a balance between the roles that they play, adjusting where necessary. This element of Super's theory is an important consideration in the career development of women, as women are often required to fulfill several roles. Wife, mother, daughter, worker, homemaker, citizen may be all roles that a women has to play simultaneously. Striking a balance between the multiple roles can require planning, organization and energy.

Super (1980) strongly indicated the inextricable intertwining of career development and personality development. One's situational determinants include family, community, school and employment. Wherever a person takes on a new role, changes a role, or gives up a role, a decision must occur. The decision made is affected by the individual's personal and situational determinants. The individual's self-concept also plays an important part in the decision-making process.

> "The basic theme is that the individual as a socialized organizer of his or her experience chooses occupations that will allow him to function in a role consistent with his self-concept and that the latter conception is a function of his development history". (Herr and Cramer, 1996, p. 232).

Theories, for example Betz and Fitzgerald (1987), Gottfredson (1981) and Teglasi (1981), developed in the 1970's and later indicate a very different career development pattern for women than their male counterparts. Theories of women's career

development had to explore an entirely new realm of pressures on career women. The roles of mother, homemaker and caregiver often conflicted with a woman's career choice. These had not been previously addressed in the career development theories for men (Betz and Fitzgerald, 1987). Betz and Fitzgerald (1987) found that the lack of female role models in non-traditional careers was a primary impediment to women entering theses fields.

Gottfredson (1981) attempted to include these variables in her theory of career development. She tried to explain why people are attracted to particular occupations, recognizing that self-concept is an important determinant. Self-concept, Gottfredson argued, is strongly affected by socio-economic status, gender, interests, values and intelligence. She suggested that self-concept is largely defined by societal norms and pressures and that these can "limit individuals' perceived occupational options to a reduced range of appropriately sex-typed alternatives" (Betz and Fitzgerald, 1987). According to Gottfredson (1981), a woman may eliminate potential occupational choices because they do not fit with her concept of self. For example, a girl who grew up knowing few women in science careers and having limited exposure to science may not see interest in science as being a trait that fit with her concept of self. She may, therefore, eliminate occupations in science from her array of potential occupations.

Gottfredson (1981) suggested that children also limit career options when they become aware of socio-economic status (SES) differences. They focus on occupations at or below their own level of SES. So by the time young people are ready to enter an occupation they have been influenced by the perceptions held by society and self on gender and social standing. Gottfredson's theory has sparked several studies that have

examined the effect of SES on occupational aspirations. Henderson, Hesketh and Tuffin (1988) tested Gottfredson's claim that SES affected career choice. They found, as did Gottfredson, that SES affected career choice after age 9, but contradicted Gottfredson's finding by asserting that ability dominated the effect of SES. Their study also supported the notion that occupational sex typing does occur, but earlier than predicted by Gottfredson. Teglasi (1981) also found that children were affected by gender stereotypes when selecting occupations.

Gottfredson (1981) suggested that some aspects of self-concept are strong influences when the individual is striving for certain career goals:

> "Gender self-concept will be the most strongly protected aspect of self, followed by the maintenance of one's social standing or worth, that is, one's social class and ability self-concepts. Thus, people will tend to sacrifice interest in a field of work to maintain sex type and prestige, and to some extent will sacrifice prestige level of sex type if that is also necessary". (p. 572).

According to Gottfredson's theory, periods of high employment will see individuals compromise occupational aspirations to a greater extent.

Betz and Hackett (1981) focused on career self-efficacy, or one's perceived ability to perform in a particular career. They explored how individuals were socialized and what affect these experiences had on their career self-efficacy. They asserted that children limit themselves to career options that match their perceived abilities in those areas. Betz and Hackett (1981) also found that girls exhibited lower self-efficacy for male dominated occupations than for female dominated occupations. Males did not exhibit different levels of self-efficacy for the different gender-dominated occupations.

Astin (1984) attempted to describe the career development of both men and women in a model that focused on career choice and work behaviour. Astin described four socio-psychological constructs that determine career choice. First, Astin postulated that motivation drives satisfaction of the primary needs of survival, pleasure and contribution and can be satisfied through work. Second, the norms and values of society are impressed upon individuals through sex-role socialization, that in turn allows the individual to experience happenings that bias career preference and work conduct. The third construct of Astin's theory is that the structure of opportunity for a individual, including the structure of their economic situation, family, occupations, determines career choice. Finally, the work expectations that an individual holds of their own strengths and opportunities will affect one's career choice and work behaviour.

Astin (1990) studied college students and found that 75% of women planned to work full-time, but only 33% of men surveyed expected their wives to work. Twenty percent of women surveyed expected to work after their children were born, while all of the men surveyed believed that women should not work while children were young. This disagreement in the beliefs of men and women concerning the roles of women in the workforce and their roles in the family may have an impact on women's career decisions.

Eccles (1986) put forward the notion that women, like men, select their major life roles and activities from the variety of options they deem appropriate. It is the subjective meaning and interpretation of success and failure that determines an individual's perceptions of the task and not the objective outcomes. Educational and career choices are guided by several factors and largely dependent on interest. An individual's expectation for success on the perceived options affects his/her choices. The individual's

psychological needs, self-identity, and long and short-term goals also affect choice. The choices made by an individual are guided by an individual's perception of gender roles. Finally, the inherent costs of investing time in one activity rather than another have an impact on career choice.

Eccles (1986) accepted that women's choice of careers rather than their avoidance of careers must be examined if there is to be a more positive perspective on women's achievement behaviour than is found in most explanations for sex differences in achievement.

Schreiber (1988) examined the characteristics affecting women's career development. Women who choose to have a family and a career must strike a balance between the two domains. Schreiber noted that women, more so than men, are seen as having to make choices between their career lives and their family roles. The choices that they make often have a negative impact on their career. A woman's decision to have a family may be seen as a drop in interest or commitment to her career. Wentling (1998) asserted that this is not a gender issue as men also make similar choices, but societal and cultural values and expectations continue to place the majority of home and family responsibility on the female (Wentling, 1998). Schreiber also explored career interruptions that she says are characteristic of women's career development. Once a woman chooses to have a family she will experience an interruption in her career. Pregnancy, birth and child rearing all cause interruptions to the career development of women, and while these events are normal and often expected, they are not well supported by the workplace in North America. These interruptions, according to

Schreiber (1988), often cost women promotions, training opportunities, career development opportunities and occasions to net-work.

The final aspect of women's career development examined by Schreiber (1988) is the diverse career patterns of women. While Super (1957) acknowledged that women's career patterns were different from men, he failed to capture the diverse nature of women's career development in his description of seven career patterns of women. Schreiber ascertained that women's career development is inherently diverse and non-linear in nature. The interplay of work and family as well as the multiple roles women assume throughout the life-span make for a variety of career development patterns – there can by many routes to attaining similar career goals (Schreiber, 1988).

The factors determining the career choices of women have not remained static. Instead, as suggested by Farmer (1985), the changing environment will continue to be a forcible determinant of career development of both men and women.

Women in Science Occupations

The underrepresentation of women in the Sciences has been a chronic problem in North America for decades. There is a substantial gap in the proportion of women to men who have pursued careers in the sciences. Nancy Betz (1997) asserted that too few females are choosing to pursue careers in science and that of those who do study science, even fewer are retained at the graduate level. The result, in the United States, is that in a workforce where women constituted 45% of the workers, they made up only 30% of all scientists and only 4% of all engineers. In 1997, women constituted 58% of Canadian

University graduates, but only comprised 20% of the graduates from engineering and applied science programs (Statistics Canada, 1999). Betz suggests that many females may avoid careers in Science because of stereotypes they have of Scientists and the work that they do.

There are numerous conditions that may influence a young woman's decision to persevere or forgo studies in science. Nevitte, Gibbons and Codding (1988) found that female science students in university were more likely than their male counterparts or than females in other disciplines, to have fathers with careers in science or science-related areas. The influence of mothers could not be determined as not enough of the mothers in the study were in science-related occupations. These female science students performed as well or better than their male peers in science; however, these same talented young women were much more likely than their peers to leave their discipline (Nevitte et al., 1988). Clearly parental influence and academic ability alone or in partnership are not enough to propel talented young women towards careers in science.

Farmer, Wardrop, Anderson and Risinger (1995) completed a longitudinal study of students in grade 9 and 12 who aspired to careers in science, mathematics or technology. The researchers were interested in the gender difference in persistence and the influence that socio-economic status had on persistence (Farmer et al., 1995). It was expected that the younger students as well as those with higher grade point averages and socio-economic status would be more likely to persist in science careers. It was also expected that young women who persisted in science would have a lower level of home commitment (Farmer et al., 1995).

The expected outcomes of younger age, higher socio-economic status or higher grade point average had a significant effect on the persistence of women in occupations in science. The men were more likely to be affected by their grade point average and by their career aspirations (Farmer et al., 1995). Home commitment did have a negative relationship with career commitment as expected. The factor that had the largest impact on women's career persistence was the elective science courses taken in high school. Those women who took science courses as electives in high school were more likely to persist in their science career aspirations (Farmer et al., 1995).

Another factor that has been purported to affect young women's decision to pursue a career in the sciences is the encouragement they receive from significant adults in their lives. Dick and Rallis (1991) found that students, both male and female, who had been encouraged to pursue careers in science were more likely to do so if they had received encouragement from a parent or teacher (Dick and Rallis, 1991).

Baker and Leary (1995) in their research with girls and their future plans to study science found that many of the young women related to their world in terms of their need for connectedness with others. Girls in their study made positive statements about science if they were seen as meeting their girls' need for connection in relationships with others. They saw science as a way of helping people and animals and creating connections with others (Baker and Leary, 1995). These findings suggest that females may have different rationale for choosing to study science than men. Gilligan (1996) also emphasized the importance of making connections in the lives of women. She found that women nurtured their understanding of their thoughts, feelings and alliances through the connections they make with others.

Belenky, Clinchy, Goldberger and Tarule (1986) also addressed the importance of connections in the lives of women. They contended that women's ways of knowing was based on their connections with other people, objects and ideas. The connections that women made in their world helped to determine the moral element of their attitudes, judgements, and behaviours. The decisions that women made are made in the context of how the outcome will affect others (Belenky et al., 1986).

In Brown and Gilligan's (1992) study of school girls, they found that girls with a strong sense of self were able to cope better with the conflicts they faced and were stronger when standing up for what they believed in. These girls had close relationships with their mothers and felt the importance of relationships with others (Brown and Gilligan, 1992).

Gender role socialization plays a role in the career choices of women and men. Internalized gender roles can lead women and men to develop different personal values and different perceptions of the tasks they must carry out in life. Women who value fulfillment of career goals as well as having a family may anticipate conflict between these roles, particularly if they perceive a career to be especially demanding of their time. Eccles (1994) found that women appeared to value being proficient in several areas or activities. Women may perceive conflict between the traditional female roles of raising a family and the demands of male-typed careers (Eccles, 1994). There has been, and continues to be, inadequate support for women's dual roles and their participation in non-traditional occupations.

Fox et. al (1979) evaluated early intervention programs developed to get more women into math and science by increasing the enrollment of bright females into math

and changing attitudes about occupations. The study found that females who received career awareness treatments and exposure to female role models expressed higher levels of educational aspirations than did females receiving no treatment (Fox, Brody and Tobin, 1979). Fox et. al (1979) suggested that an ideal career intervention would include information about occupations, assessment of the client's potential to work in particular careers, activities that let the client acquire skills to handle problems, and means of support for the client.

Eccles (1994) reported that from grade 7 onward girls had lower confidence in their mathematical abilities than their english and that girls had lower expectations for future successes in math than did their male counterparts. Parents thought math was harder for daughters than for sons, despite researchers finding equivalent grades for boys and girls. Parents rated advanced math courses as less important for daughters than for sons and english and history as more important for daughters. Eccles (1994) suggested that these findings proposed that males and females of approximately equivalent math ability had a different perception of the causes of success and failure in math. If one assumes that females acquire different attributional patterns, beliefs and values for success at different occupations, and that these patterns are associated with the gender role appropriateness of the career and one's other long range goals, then understanding these patterns can help to explain the preference for gender-appropriate careers.

Women's Career Development and Mentoring

Human relationships involving mentorship date back to Homer's *Odyssey*, when the son of Odysseus, Telemachus, was encouraged under the mentorship of Athena, the Goddess of Wisdom. Just as Athena nurtured Telemachus to become a leader, women today provide encouragement and impart wisdom to protegees (Bizzari, 1995; Didion, 1995). Mentoring is found in many disciplines including health, business, science and education. Mentoring can be described as an exclusive, often intense, relationship between two individuals. The mentor imparts knowledge, coaching, encouragement and emotional support to the protegee. The Oxford Dictionary defines mentor as "an experienced and trusted advisor", while Webster's uses the definition, "1. A close, trusted, experienced counselor or guide. 2. Teacher, tutor, coach". Bowen (1985) provides a succinct definition that furnishes clear descriptions of the roles of mentor and protegee:

> "Mentoring occurs when a senior person (the mentor) in terms of age and experience undertakes to provide information, advice and emotional support for a junior person (the protegee) in a relationship lasting over an extended period of time and marked by substantial emotional commitment by both parties. If the opportunity presents itself, the mentor also uses both formal and informal forms of influence to further the career of the protegee" (p. 31).

Bowen's definition is useful for the purposes of this paper, albeit not without criticism. Bowen states the mentor must be the protegee's chronological senior. In today's environment it is possible for a younger person to have the skills, knowledge and experience to be a beneficial mentor to an older person. Bowen correctly acknowledges

that a mentoring relationship requires commitment from both parties and is therefore a dual venture.

While studying career development relationships, Kram (1983) concluded that mentoring relationships are developmental relationships with two aspects. Firstly, mentoring relationships have career or instrumental functions, and secondly, they have psychosocial functions. Career functions further the development of the protegee's career and may include such behaviors as coaching, sponsoring, challenging, and promoting. Psychosocial functions help to encourage in the protegee's positive self-esteem, a sense of competence, and identity and may include such behaviors as counseling, modeling, affirming and befriending. Kram (1983) further stated that some elements of both aspects must be present in a true mentoring relationship. The individual personalities and needs of both parties will affect the career and psychosocial functions which are employed in the relationship (Yoder, 1990).

Yoder (1990) described four phases which true mentoring relationships go through. The first phase sees the institution of the relationship and is often referred to as the initiation phase. Phase two, the cultivation phase, is when the career and psychosocial functions described by Kram (1983) are developed. Separation of the mentor and protegee occurs in phase three. Finally, in phase four, the relationship either ends or is completely redefined.

The success of a mentoring relationship is heavily dependent on the compatibility of the personalities of the mentor and the protegee. Positive outcomes are more likely when there exists a good fit between the personalities of the protegee and mentor. Much of the literature (Evans, Whigham and Wang, 1995; Marlow and Marlow, 1996) has

focused on the perspective of the protegee when establishing the success of a mentoring relationship. It is important to recognize the viewpoint of the mentor (Yoder, 1990). Mentors often report feelings of empowerment and personal satisfaction. Their involvement in successful mentoring brings the mentor to the realization that they can have a positive impact on another individual and often a larger community as well (Yoder, 1990).

Mentors, often characterized as teachers and guides, have been documented as being valuable to adolescents who may be dealing with dropping out, becoming teenage parents, becoming involved in delinquent behavior or emotional distress. There is evidence which suggests that teens that are resilient to these risky behaviors have a positive relationship with a non-parental adult. Mentors provide protegees with help in decision making, suggestions for improvement and exposure to new skills (Sullivan, 1996). Sullivan described the mentor-protegee relationship as being uni-directional, transitional and future oriented. The focus is on those behaviors of the mentor that can benefit the protegee. It attempted to bring the protegee to a higher level of development where they eventually transcend the need for the relationship (Sullivan, 1996).

Mentoring may be a natural outreach of society's expectations of women as nurturers and caregivers. Mentors nurture their protegees, helping them to reach their career and educational goals (Bizarri, 1995). A mentorship relationship places strong emphasis on making connections between individuals. Gilligan (1996) emphasized the importance of making connections in the lives of women. She found that women nurture their understanding of their thoughts, feelings and alliances through the connections they make with women. In particular, Gilligan found that adolescent girls spoke of the

importance of adult women they knew who validated them, guided their futures and really listened to their voices. The girls who had relationships with adult women were in less distress than girls were with none.

Gilligan, Lyons and Hanmer (1990) identified ages 11 to 12 as a pivotal time in adolescence when girls start to lose their voices. They feel they must choose between the knowledge they have gained and the voices of authority. The new voices of authority conflict with the girls' knowledge. They are afraid to bring their real voice into adulthood. Gilligan et. al suggest that "relationships between girls and adult women may be particularly critical during the transition into adolescence," (Gilligan et. al 1990, p. 6) as girls in this life stage are enthusiastic about listening to advice from women. Adults, particularly women, may have the capacity to help adolescent girls navigate between their seemingly paradoxical needs for independence from their parents and direction from adults with knowledge (Rhodes and Davis, 1996). Women, as mentors, can help girls while allowing them to gain autonomy. The development of relationships between girls and women can help girls to gain healthy perspectives and develop better resistance to social and psychological problems they will encounter (Sullivan, 1996).

A mentorship program for young girls might benefit them most at this pivotal age, when they are at greatest danger of losing their voice. To make a connection with women who have kept their voices and have developed careers and still maintained important relationships, might encourage these girls that they too can keep their voices and their knowledge of their world.

Mentors generally occur in one of two ways. The most common, although not studied in detail until recently, is that of natural mentors, those adults in the lives of

young people who provide them with guidance, encouragement, assistance and support. These mentors are usually aunts, grandmothers, older sisters, cousins, neighbors, teachers or counselors. While their role in the life of the adolescent is similar to that of parent or primary caregiver, they usually do not relate to the protegee with the same emotional intensity as the parental figure. The second type of mentor is an assigned mentor, such as one found in the Big Brothers/Big Sisters program and the hundreds like it that are in existence all over North America. Whereas natural mentors arise from the protegee's familial and social support system, assigned mentors are more artificial (at least initially) and may therefore not be capable of having the same impact on the protegee.

In a study by Rhodes and Davis (1996), adolescent girls were asked to identify natural mentors in their lives. Forty-five percent of the girls in the study identified natural mentors, 85% of who were women. Ninety-five percent of the girls reported seeing their mentors at least once a week. The group of adolescent girls who identified mentors in their lives was compared with a group of female adolescents with no mentors. Both groups were exposed to equivalent levels of stress in their lives. The group of adolescents with identified mentors experienced less depression than the group with no mentors (Rhodes and Davis, 1996) In seeking to understand this relationship, Rhodes and Davis admitted that individuals with mentors may be better at developing and maintaining social support systems than the group without. This propensity for successful use of support systems may have accounted for the lower levels of depression. The study, however, supported the notion that mentor relationships appear to provide adolescent girls with a context for understanding relationship problems (Rhodes and Davis, 1996). The presence of a mentor in a girls' life may amplify her aptitude to seek

and comprehend the positive aspects of social supports in her life and help her to cope more effectively with relationship problems (Rhodes and Davis, 1996).

There is evidence that mentoring relationships have the potential to promote women's career development (Dreher and Cox, 1996; Hansman, 1998; Yoder, 1990). Both formal and in-formal mentoring relationships can have a positive affect on women's career development by building self-esteem, providing career advice, helping to advance the protegee's career and providing friendship and support (Hansman, 1998).

Mentoring relationships between women have been in existence for centuries in an in-formal sense. Young women often attribute their successful development in various areas to the presence of another woman in their life, such as an extraordinary relative, teacher or family friend (Rhodes and Davis, 1996). These natural mentors have been shown to help girls and young women to overcome adversity, resolve conflicts, explore career options and choose career paths (Rhodes and Davis, 1996; Sullivan, 1996; Marlow and Marlow, 1996; Hansman, 1998; Gilligan et. al 1990). In African American culture, these figures are often referred to as "othermothers" and are recognized as women in the community who provide guidance and support to young women, often acting as surrogate parents and mediators for family conflicts (Rhodes and Davis, 1996). Rhodes and Davis (1996) also noted that female mentors to girls also occur in many Latino families. They found that the presence of natural mentors seems to have a very positive impact on the lives of young women who experience stress and face adverse conditions, often making the young women more resilient and assisting in a positive transformation in their lives.

Research by Sullivan (1996) indicated that the success of mentoring relationships between adolescent girls and women is dependent on the ability of the mentor to "listen, understand, and validate the knowledge, experience, and feelings of the adolescent". Her findings indicated that successful mentoring relationships helped girls to gain perspective on their lives, develop healthy relationships and manage the crises they face.

Mentoring may be an intrinsic extension of women's roles as nurturers and caregivers and their dependence on making connections with others. Many professions pursued by women, such as those in education, health care and the social sciences are steeped in traditions of nurturing others. Mentors often nurture the occupational aspirations of the women they connect with, particularly when they have developed successful careers of their own. Mentors can act as role models, demonstrating the rewarding aspects of maintaining a career and a family life. Mentors can assist young women in overcoming the obstacles they face on the path to realizing their career potential. Lack of access to mentors can limit one's potential to achieving success in their pursuit of a occupation. Career attainment, according to Bizarri (1995) is not solely dependent on academic success and resources to pursue an education. The encouragement given to women as they explore and prepare for occupations, particularly non-traditional occupations, is critical. Mentors can play an important role in helping women attain their career goals by providing support, guidance and encouragement (Bizarri, 1995).

There has been tremendous documentation in the past thirty years that indicated that women are underrepresented in science oriented occupations (Baker and Leary, 1995; Evans, Whigham and Wang, 1995; Marlow and Marlow, 1996). In an effort

to lessen the gender disparity, many researchers have focused on ways to increase girls' participation in math and science during middle school and high school (Marlow and Marlow, 1996; Tobin and Garnett, 1987). There is a growing body of research that suggests mentors may have a positive impact on encouraging girls to consider and pursue science related careers (Didion, 1995; Marlow and Marlow, 1996; VanLuevan, 1997). For girls, accessing a mentor may help them to better understand themselves in relation to their goals, abilities and career choices.

While there is a growing body of literature (Baker and Leary, 1995; Bizzari, 1995; Carden, 1990; Didion, 1995; Evans, Whigham and Wang, 1995) relating to the concept of mentoring in many fields, not all of the literature provides a clear awareness of the phenomenon. Yoder (1990) attempted to clarify the definition of the mentoring relationship by distinguishing it from the related concepts, such as role modeling, sponsorship, precepting and peer strategizing. She stated that mentorship involves an interpersonal relationship between the mentor and the protegee; however, role modeling does not necessarily involve this type of interaction.

Yoder (1990) emphasized that compatibility between the mentor and protegee is important to the success of the relationship. It is essential that both parties feel enabled and satisfied with the conditions and progress of the relationship. Positive outcomes are much more likely when both parties are comfortable with each other and believe that they bring value to the relationship (Yoder, 1990).

Evans, Whigham and Wang (1995) explored the effect of female role models on the attitudes of males and females towards careers in science, math and technology. Their study found that female role models were effective in changing the girls' attitudes.

The intervention significantly changed girls' attitudes on five of six related factors (Evans, Whigham and Wang, 1995).

The Association for Women in Science in the United States (AWIS) implemented a mentoring program in 1990 that aimed to attract and retain women undergraduate and graduate students in the sciences (Didion, 1995). The AWIS surveyed the women in the program and found that prior to participation in the program, 77% perceived barriers for women entering and remaining in science. Sixty-two percent of the women reported that the mentoring program helped them to address these barriers (Didion, 1995). In addition to helping the protegees to address concerns about science and exposing them to female scientists, the AWIS mentoring project was of great benefit to the mentors. They enjoyed the contact with students, networked with other female scientists, and acknowledged their own ability to contribute to the growth of their profession (Didion, 1995).

Contemporary research (Brickhouse, 1994; Howes, 1998; Marlow and Marlow, 1996) into science education clamors for theory and practice into how to create an egalitarian science that increases science success for females. Howes (1998) suggested that in addition to listening to and learning from students, educators must find a way of helping girls connect science to their real lives (Howes, 1998). "Historically, scientific values were not constructed in gender-neutral terms...Even today, success in science frequently requires the abandonment of characteristics that the culture labels 'feminine'" (Brickhouse, 1994, pp. 893). Howes (1998) suggested that science, with its traditionally masculine characteristics might not change as quickly as is necessary to permit girls to connect with it. Girls may need to engage in science as it currently exists in our society (Howes, 1998). Girls who can connect with women who work in science can experience

how science affects "real-life". Real women can bring girls into real-life experiences with science, thus permitting them to view a career in science as a realistic option for them.

> "The very fact that girls are given the chance to interact outside of school with female mentors in mathematics and science provides a unique and personal experience that may lead to better understanding of themselves in relation to their future opportunities, achievement, and choices." (Marlow and Marlow, 1996, p.152).

Summary

Theories of women's career development have shifted from adaptations of theories that initially focused on male career behaviour to paradigms that seek to explain the unique factors and demands influencing female career development. The theories explored in this chapter indicate that women's career development is multi-faceted and highly complex. Many factors including, but not limited to, self-efficacy, socio-economic status, influence of role-models, values, intelligence, familial and societal expectations and assumed life roles combine to influence the occupational decisions a woman makes in her lifetime. These factors do not remain static and will likely continue to change. No theory has succinctly accounted for all of the factors that influence women's occupational choice or adequately proposed a framework upon which an all-encompassing theory may be built.

As is evident in the research cited, the gender disparity in the sciences and science-related occupations continues to be a concern, despite numerous inventions over the past few decades. This study focused upon mentorship as a possible intervention strategy. As the citations in this chapter have indicated, researchers, (for example Baker and Leary (1995); Bizarri (1995); Rhodes and Davis (1996), and Sullivan (1996)), have found mentoring to be a positive force in the lives of young women and propose that mentoring has the potential to promote the career development of women, particularly in the sciences.

Selected research conducted for this study will be presented in the proceeding chapter. The research was aimed at learning more about the existence of mentors in the lives of adolescent females and the influence, if any, that identified mentors had on the young women's self-esteem, attitudes toward science and science-related occupations, future aspirations and educational and occupational plans.

Chapter Three

METHODOLOGY

Introduction

There are many factors influencing the occupational choices of young women. At present the combination of personal and societal pressures often leads both men and women into gender stereotypical occupations. This researcher is interested in the variables that influence the role of a mentor in the lives of young women, particularly how these variables influence career aspirations, attitudes towards science and science related careers and self-esteem. In this chapter the methodology for this study will be described.

Instrument

This study used one procedure. A questionnaire was developed and administered to female students enrolled in Science courses at an urban high school in Newfoundland.

The questionnaire sought information in the following areas: demographic; experience with mentors; interest in and attitudes towards science and science related careers; the perceived impact of mentors on career interest; attitudes towards self, and educational and occupational plans. The demographic section asked about the respondent's age, grade level and parent's employment status. The other questions

gathered information about the students' science courses taken to date, plans to study science in the future, their career plans and attitudes towards science and related careers. Students were also questioned about the mentors in their lives and the influence mentors have had on their career plans. Students were asked about their attitudes towards themselves. Finally, females were asked about their occupational plans. These queried areas were assessed by means of a series of statements asking students to indicate how strongly they agreed or disagreed with statements using a scale consisting of: strongly agree, agree, disagree, strongly disagree and not applicable. For the purposes of statistical calculations these statements were assigned a code form 1 – 4, one representing "strongly agree" and four was representing "strongly disagree". The response of "not applicable" was not included in statistical calculations.

Subjects

The subject pool consisted of 121 female students enrolled in science courses at an urban high school in Newfoundland. Seventy-five students completed and returned the questionnaire.

Method

The researcher met with science teachers at the urban high school. The research purpose and methodology were explained. All science teachers agreed to assist. They were then provided with a letter to be distributed to all female students enrolled in their

science courses (please find letter in Appendix C) as well as a letter for parents of these students (please find letter in Appendix C). The letter informed students and their parents of the nature of the research to be undertaken and of the adherence to confidentiality for all students. Students and their parents were also informed that participation was voluntary and could be withdrawn at any time. The researcher offered to be available to answer questions to any students or parents if further explanation of the study was required.

Teachers collected the signed consent forms and then distributed the questionnaire to students who had consented to participate. Questionnaires were completed during class time and returned to the researcher at a later date. The researcher had no direct contact with the subjects regarding the content of the questionnaire or the process of the study.

Despite conducting the survey during school time, only 61% of the subject pool completed and returned the questionnaire. This may have been do to several reasons including, lack of student or parental consent, lack of desire to participate or student absenteeism.

Data Analysis

The data analysis for this study was completed using SPSS, a statistical program used in the social sciences. Descriptive statistics such as frequencies, percentages, and cross-tabs were used to summarize findings and answer questions. Cross tabs were used to answer questions requiring comparisons between two or more variables. Using a 95%

confidence interval, chi-squares were used to determine whether or not observed differences between variables were statistically different. Data findings are presented in the proceeding chapter.

Chapter Four

Introduction

In this chapter, the results of the data will be presented and discussed. Each of the research questions will be stated, followed by the questionnaire responses that relate to that research question. The data will be presented in charts that indicate the frequency and percentage of each response and whether there was a significant difference between responses. Data were examined in two ways. For some questions, responses were examined across grade levels to see if there was a significant difference in responses between grades. Secondly, data were compared between the group of females who identified the presence of a mentor(s) in their lives and those who did not. Findings follow in the next sections.

Data Analysis and Discussion

The group studied in this evaluation was females in Levels I, II and III at an urban high school who were enrolled in at least one science course. Seventy-five females completed and returned the questionnaire out of a possible 121. Descriptive statistics were generated to provide some insight into the group under study.

As can be seen from Table 1, the females in this study successfully completed many of the academic high school science courses. While only four credits, or two

courses in science are required for graduation, many females in Level III had completed more than the required amount. Fifty-four percent of Level III females completed 3-4 courses, 40% completed 5-6 courses and 4% completed more than 6 courses in science. This finding is promising as it indicates that 98% of females in this sample chose to complete more science courses than were required, with 44% completing more than twice the number of required courses.

Table 1
Science Courses Completed by Grade Level
(N = 75)

Number of Courses Completed	Level I (N = 22)		Level II (N = 23)		Level III (N = 25)	
	Freq.	%	Freq.	%	Freq.	%
1 – 2	21	95.5%	11	47.8%	1	4.0%
3 – 4	1	4.5%	12	52.2%	13	52.0%
5 – 6					10	40.0%
More than 6					1	4.0%

Note: $X^2 = 51.49$, $p > .05$

Are there significant differences among Level I, II and III females enrolled in science courses at an urban high school in their attitudes towards science?

Students were questioned about their attitudes towards science through several questions using a likert type scale. Number 10 on the questionnaire asked females to respond to the statement, "I am good at science". Of the Level I females surveyed, 54.5% agree that they are good at science. Eighty-six point nine percent of the Level II's and 83.3% of the Level III's agree with this statement. There was no significant difference between groups in their responses. These numbers are shown in table 2.

Question 13 on the questionnaire asked students to respond to the statement, "I feel confident that I will do well in science". In Level I, 68.2% agreed with this statement. Of the Level II's, 87.1% agreed, while 84% of the Level III's agreed with the statement. These values are reflected in table 3. Again, no significant difference between groups was found.

Table 2
Question 10 – "I am good at Science" by Grade Level
(N = 75)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	%	Freq.	%	Freq.	%	Freq.	%	Freq.
Level I	13.6	3	40.9	9	45.5	10	0	0
Level II	13.0	3	73.9	17	13.0	3	0	0
Level III	20.8	5	62.5	15	12.5	3	4.2	1

Note: $X^2 = 17.93, p > .0$

Table 3
Question 13 – "I feel confident that I will do well in Science" by Grade Level
(N = 75)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	4	18.2%	11	50.0%	6	27.3%	1	4.5%
Level II	7	30.4%	13	56.5%	2	8.7%	1	4.3%
Level III	9	36.0%	12	48.0%	3	12.0%	1	4.0%

Note: $X^2 = 4.34$, $p > .05$

While the results of these two questions do not significantly differ across grade levels, they are very promising. A high percentage of the females surveyed display confidence in their abilities in science.

The results of this study also indicate that the majority of females studied felt that their abilities in science are respected by their peers, both male and female, and by their teachers. This was consistent across all grade levels, as indicated in Tables 4, 5 and 6.

Table 4
Question 31 – "I feel that my abilities in the Sciences are respected by my female peers" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	3	13.6%	15	68.2%	4	18.2%	0	0%
Level II	4	17.4%	12	52.2%	7	30.4%	0	0%
Level III	3	12.5%%	19	79.2%	2	8.3%	0	0%

Note: $X^2 = 4.56$, $p > .05$

Table 5
Question 32 – "I feel that my abilities in the Sciences are respected by my male peers" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	3	13.6%	14	63.6%	5	22.7%	0	0%
Level II	3	13.0%	14	60.9%	6	26.1%	0	0%
Level III	2	8.3%	18	75.0%	4	16.7%	0	0%

Note: $X^2 = 1.23$, $p > .05$

Table 6
Question 33 – "I feel that my abilities in the Sciences are respected by my teachers" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	4	18.2%	13	59.1%	5	22.7%	0	0%
Level II	6	26.1%	14	60.9%	3	13.0%	0	0%
Level III	7	28.0%	15	60.0%	2	8.0%	1	4.0%

Note: $X^2 = 4.13$, $p > .05$

The majority of females who responded to the questionnaire agreed that science was an important subject to study. In Level I, 90.9% agreed, in level II 95.6% agreed and 96% of level III's agreed with the statement, "I believe science is an important subject to study".

To further assess females attitudes towards science, participants were questioned on the degree to which they agreed or disagreed with statements regarding differences between males and females in science. Question 14 asked participants to respond to the statement, "Males and females perform equally well in science". As indicated in table 7, there was no significant difference in the responses of students for this statement. Table 7 shows that 86.4% of Level I's agreed with this statement, 82.6% of Level II's agreed and 88% of Level III's. This is a fairly positive finding, showing that the majority of females in all levels of senior high felt they were equal to their male counterparts with respect to performance in science.

Table 7
Question 14 – "Males and females perform equally well in Science" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	6	27.3%	13	59.1%	3	13.6%	0	0%
Level II	8	34.8%	11	47.8%	4	17.4%	0	0%
Level III	13	52.0%	9	36.0%	2	8.0%	1	4.0%

Note: $X^2 = 5.95$, $p > .05$

Are there significant differences among Level I, II and III females enrolled in science courses at an urban high school as per students' perceptions of women in science occupations?

Females were questioned about their perception of the availability of science occupations for women as well as whether or not science occupations were more difficult for women than men. The results, as indicated in Tables 8 and 9, were very promising as a very high percentage of females agreed that science occupations were accessible to women. Most females also disagreed with the statement, "Occupations in science are more difficult for women than men". There was no significant difference in the responses across grade level, thus indicating that these attitudes are fairly stable throughout the young women studied.

Table 8
Question 17 – "Occupations in Science are accessible to women" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	7	31.8%	15	68.2%	0	0%	0	0%
Level II	11	47.8%	10	43.5%	2	8.7%	0	0%
Level III	15	60.0%	9	36.0%	0	0%	1	4.0%

Note: $X^2 = 10.54$, $p > .05$

Table 9
Question 18 – "Occupations in Science are more difficult for women than men" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	0	0%	0	0%	17	77.3%	5	22.7%
Level II	1	4.3%	3	13.0%	15	65.2%	4	17.4%
Level III	2	8.3%	0	0%	11	45.8%	11	45.8%

Note: $X^2 = 13.42, p > .05$

Are there significant differences among Level I, II and III females enrolled in science courses at an urban high school as per students' plans to pursue an occupation in science or a science related field?

Students were asked to respond to the statement, "I am considering pursuing a career in science". As indicated in table 10, 50% of level I's, 47.8% of level II's and 66.7% of level III's agreed that they were considering a career in a science or science related field. Students who agreed with this statement were then asked if their decision to pursue an occupation in Science has been influenced by a significant women in their life. In level I 33.3% agreed, 23.1% of level II's agreed and 35.3% of the level III students. This information is conveyed in table 11. There was no significant difference across grade levels in the responses for either of these questions.

Table 10
Question 15 – "I am considering pursuing a career in science" by Grade Level
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	4	20.0%	6	30.0%	8	40.0%	2	10.0%
Level II	8	34.8%	3	13.0%	10	43.5%	2	8.7%
Level III	9	37.5%	7	29.2%	4	16.7%	4	16.7%

Note: $X^2 = 6.66$, $p > .0$

Table 11
Question 16 – "If I agree with #15, my decision to pursue an occupation in science has been influenced by a significant woman in my life" by Grade Level
(N = 48)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Level I	2	11.1%	4	22.2%	9	50.0%	3	16.7%
Level II	1	7.7%	2	15.4%	9	69.2%	1	7.7%
Level III	1	5.9%	5	29.4%	6	35.3%	5	29.4%

Note: $X^2 = 4.55$, $p > .05$

This study sought to examine the degree to which significant adults in the lives of young women influenced the women's career choices. In level I, 81.8% affirmed that a significant adult had influenced their decisions about future careers. The percentage who agreed with this dropped to 60.9% in level II and further declined to 48% in level III. While this was not a statistically significant decline, a pattern emerged that as young women progress through high school, they appeared to be less likely to have career decisions influenced by significant adults in their lives.

When asked if they had been encouraged by an adult to pursue an occupation in science or a science-related field, an average of 41.4% said "yes". This percentage closely corresponded to the number of students (44%) who planned to pursue an occupation in science or a science-related field, while 59% planned to study science in college and 69.1% in university.

In addition to examining the data by comparing responses by grade level, responses were compared by those students who identified mentor(s) in their life and those who did not. This was done to examine the specific impact the presence of a 'natural mentor' might have on such factors as attitudes towards science, attitude toward self and feelings about gender differences in the sciences. These groups were also compared with respect to the career choices young women make. Seventy-five percent of the females who responded identified a mentor or mentors in their lives.

Are there significant differences among the females in urban high schools who identify mentors in their lives and those who do not identify mentors as per their attitudes towards self in the present?

Mentors, in addition to providing guidance and support, may have an affect on the self-esteem of the protegees. This study sought to determine if this were true with those young women in the study who had identified natural mentors. The data were examined to determine if there were a significant difference among the females who identified mentors and those who did not as per their attitudes towards self in the present. Specifically, responses to items 30 and 34 on the questionnaire were examined. Question 30 asked respondents to indicate the degree to which they agreed or disagreed with the statement, "I am confident when voicing my opinions". Tables 12 and 13 summarize the young women's responses for these questions.

Table 12
Question 30 – "I am confident when voicing my opinions" by Identification of a Mentor
(N = 69)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	14	25.5%	32	58.2%	8	14.5%	1	1.8%
No Mentor	2	14.3%	11	78.6%	1	7.1%	0	0%

Note: $X^2 = 2.07$, $p > .05$

Table 13
Question 34 – "I believe I make important contributions at school" by Identification of a Mentor
(N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	11	20.0%	31	56.4%	13	23.6%	0	0%
No Mentor	3	20.0%	6	40.0%	6	40.0%	0	0%

Note: $X^2 = 1.76$, $p > .05$

The lack of a significant difference among grade levels for each of these statements and the fact that the majority of the young women are in agreement with the statements provides some positive information. These young women appear to feel they have a voice and that their voices are shaping the happenings in their school.

Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their self-esteem?

Statement 35 asked students to respond to the statement, "I am happy most of the time". Of those students who identified mentors, 94.6% agreed with this statement. 80.0% of students without mentors agreed with this statement. Again, while there is no statistically significant differences in the responses between the two groups, the numbers indicate that as a group, the young women in the study are reasonably content. Question 36 asked students to respond to the statement, "I have good self-esteem". The two groups were equally matched in agreeing with this statement as 80.0% of both groups agreed. The statement for item 37 was, "I like who I am". 92.7% of females with mentors agreed with this statement, and 80.0% of students without mentors. Tables 14, 15 and 16 summarize these findings.

Table 14

Question 35 – "I am happy most of the time" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	21	38.2%	31	56.4%	2	3.6%	1	1.8%
No Mentor	3	20.0%	9	60.0%	2	13.3%	1	6.7%

Note: $X^2 = 4.07$, $p > .05$

Table 15
Question 36 – "I have good self-esteem" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	21	38.2%	23	41.8%	10	18.2%	1	1.8%
No Mentor	2	13.3%	10	66.7%	2	13.3%	1	6.7%

Note: $X^2 = 4.89$, $p > .05$

Table 16
Question 37 – "I like who I am" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	21	38.2%	30	54.5%	3	5.5%	1	1.8%
No Mentor	2	13.3%	10	66.7%	2	13.3%	1	6.7%

Note: $X^2 = 4.51$, $p > .05$

These are very positive findings. In a time when there is often concern over the self-esteem of young women, these results paint a positive picture of young women, who, for the most part, are happy, confident in their abilities and like the young adults they have become. This positive trend is true for both those young women who feel they have significant adults who guide them and those who do not.

Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their attitudes towards self in the future?

In addition to examining the affect of mentors on the young women's attitude toward self in the presence, the study also explored their affect on the young women's attitude toward self in the future. Specifically, items 24, 25, 27 and 28 on the questionnaire probed this question. Again, each of these items required respondents to rate the statements using a Likert-type scale. Questions 24 and 25 asked students to indicate the likelihood that they would graduate from college or university. Of those students with mentors, 78.5% agreed that they would likely graduate from college. For students without mentors, 63.7% thought they would graduate from college. Similar findings were present for those students who expected to graduate from university. For item 27, students had to respond to the statement, "If I choose to have a family, I will

continue to also maintain my career". All students agreed with this statement, as indicated in Table 19. It had been expected that those students with mentors might be more likely to agree to this statement. The finding is a positive one as it indicates that students value their future careers and believe striking a balance between work and family is possible. The responses suggest that the young women are optimistic about managing dual roles in their future. Item 28 explored the young women's belief that a mentor would help in attaining future career goals. While not statistically different, 92.6% of the group with identified mentors strongly agreed or agreed, while only 46.7% of the non-mentor group strongly agreed or agreed. It is possible that for the group with identified mentors, their experiences have shown them the benefits of having such a support person in their lives.

Table 17
Question 24 – "I will likely graduate from college" by Identification of a Mentor
(N = 53)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	19	45.2%	14	33.3%	9	21.4%	0	0%
No Mentor	4	36.4%	3	27.3%	3	27.3%	1	9.1%

Note: $X^2 = 4.21$, $p > .05$

Table 18
Question 25 – "I will likely graduate from university" by Identification of a Mentor
(N = 68)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	31	58.5%	13	24.5%	8	15.1%	1	1.9%
No Mentor	6	40.0%	7	46.7%	2	13.3%	0	0%

Note: $X^2 = 2.99$, $p > .05$

Table 19

Question 27 – "If I choose to have family, I will continue to also maintain my career" by Identification of a Mentor (N = 69)

Grade	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	38	70.4%	16	29.6%	0	0%	0	0%
No Mentor	10	66.7%	5	33.3%	0	0%	0	0%

Note: $X^2 = .08$, $p > .05$

Table 20

Question 28 – "Having a mentor or role model would help me in attaining my career goals" by Identification of a Mentor (N = 69)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	25	46.3%	25	46.3%	4	7.4%	0	0%
No Mentor	1	6.7%	6	40.0%	5	33.3%	3	20.0%

Note: $X^2 = 21.85$, $p > .05$

Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their attitudes towards science?

As indicated in tables 2 through 8, there was no significant difference across grade levels in the young women's attitudes towards science. The data were also examined to determine if there were significant differences among the females who identify mentors and those who do not identify mentors as per their attitudes towards science and occupations in science. Specifically items 10, 12, 13, 14, 17, 18, 19, 20, 21 and 22 were analyzed with respect to the two groups. These data are summarized in tables 21 through 30.

Table 21
Question 10 – "I am good at science" by Identification of a Mentor
(N = 69)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	9	16.7%	33	61.1%	12	22.2%	0	0%
No Mentor	2	13.3%	8	53.3%	4	26.7%	1	6.7%

Note: $X^2 = 3.90$, $p > .05$

Table 22
Question 12 – "I believe science is an important subject to study" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	30	54.5%	23	41.8%	2	3.6%	0	0%
No Mentor	6	40.0%	7	46.7%	1	6.7%	1	6.7%

Note: $X^2 = 4.47$, $p > .05$

Table 23
Question 13 – "I feel confident that I will do well in science" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	16	29.1%	31	56.4%	6	10.9%	2	3.6%
No Mentor	4	26.7%	5	33.3%	5	33.3%	1	6.7%

Note: $X^2 = 5.26$, $p > .05$

Table 24
Question 14 – "Males and females perform equally well in science" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	22	40.0%	25	45.5%	7	12.7%	1	1.8%
No Mentor	5	33.3%	8	53.3%	2	13.3%	0	0%

Note: $X^2 = 0.57$, $p > .05$

Table 25
Question 17 – "Occupations in science are accessible to women" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	29	52.7%	24	43.6%	2	3.6%	0	0%
No Mentor	4	26.7%	10	66.7%	0	0%	1	6.7%

Note: $X^2 = 7.20$, $p > .05$

Table 26
Question 18 – "Occupations in science are more difficult for women than men" by Identification of a Mentor
(N = 69)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	2	3.7%	3	5.6%	34	63.0%	15	27.8%
No Mentor	1	6.7%	0	0%	9	60.0%	5	33.3%

Note: $X^2 = 1.21$, $p > .05$

Table 27
Question 19 – "There are more barriers for women pursuing science occupations than there are for men" by Identification of a Mentor
(N = 68)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	3	5.7%	10	18.9%	30	56.6%	10	18.9%
No Mentor	0	0%	1	6.7%	12	80.0%	2	13.3%

Note: $X^2 = 3.16$, $p > .05$

Table 28
Question 20 – "Women can succeed in occupations in science" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	36	65.5%	19	34.5%	0	0%	0	0%
No Mentor	9	60.0%	6	40.0%	0	0%	0	0%

Note: $X^2 = 0.15$, $p > .05$

Table 29
Question 21 – "Women can have an occupation in science and have a family" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	32	58.2%	22	40.0%	1	1.8%	0	0%
No Mentor	10	66.7%	5	33.3%	0	0%	0	0%

Note: $X^2 = 0.55$, $p > .05$

Table 30
Question 22 – "An occupation in science is possible for me" by Identification of a Mentor
(N = 70)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	23	41.8%	21	38.2%	9	16.4%	2	3.6%
No Mentor	7	46.7%	4	26.7%	3	20.0%	1	6.7%

Note: $X^2 = 0.85$, $p > .05$

Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their plans regarding career and family?

Questionnaire items 21 and 27 were analyzed to determine the plans the young women had for future career and family. As indicated in Table 29, almost all of the young women with and without identified mentors agreed with the statement. "Women can have an occupation in science and have a family". Item 27 read, "If I choose to have a family, I will continue to also maintain my career goals". As indicated in table 31, all females agreed with this statement.

Table 31

Question 27 – "If I choose to have a family, I will continue to also maintain my career goals" by Identification of a Mentor (N = 69)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	38	70.4%	16	29.6%	0	0%	0	0%
No Mentor	10	66.7%	5	33.3%	0	0%	0	0%

Note: $X^2 = 0.08$, $p > .$

There was no significant difference between the responses for the group of females with mentors and the group of females without mentors. This finding indicated that all of the young women who participated in the study believed that their career goals would not be compromised by their choice to have a family. These young women believed that they could attain a balance between career and family and have both.

Are there significant differences among the perceptions of females in levels I, II and III enrolled in science courses in an urban high school on the importance of the role of mentors in influencing career plans/aspirations?

To answer this research question the females in the study were presented with two questions to which they were asked to repsond "yes" or "no". Item 39a read, "Significant adults in my life have influenced by career decisions". Item 39b read, "I have been encouraged by one (or more) adults to pursue an occupation in a science or science related field". Tables 32 and 33 summarize the responses of the young women for each of the questions.

Table 32
Question 39a – "Significant adults in my life have influenced my career decisions" by Grade Level
(N = 70)

Grade	Yes		No	
	Freq.	%	Freq.	%
Level I	18	81.8%	4	18.2%
Level II	14	60.9%	9	39.1%
Level III	12	48.0%	13	52.0%

Note: $X^2 = 5.79$, $p > .05$

While there was no statistically significant difference between the grade levels, a pattern appeared to emerge. The younger students appeared more likely to have their career decisions influenced by adults than did the older students. This may be a result of the young women maturing and acting more independent and therefore feeling less influenced by the adults in their lives.

Table 33
Question 39b – "I have been encouraged by one (or more) adults to pursue an occupation in a science or science-related field" by Grade Level
(N = 70)

Grade	Yes		No	
	Freq.	%	Freq.	%
Level I	9	40.9%	13	59.1%
Level II	6	26.1%	17	73.9%
Level III	14	56.0%	11	44.0%

Note: $X^2 = 4.42$, $p > .05$

Again, there were no significant differences in the responses among grade levels. This author found it disheartening that on average, only 41.4% of the females in the study had ever been encouraged by an adult to pursue an occupation in a science or science-related field. Perhaps part of the problem of the under-representation of women in these type occupations is that as a society we do not offer sufficient support and encouragement to women to pursue non-traditional, male dominated occupations. We see that most of these young women believed that women were capable of science occupations (Table 28), that these occupations were accessible to women (Table 25) and that women could be successful in these occupations (Table 28). These beliefs, however, have not historically translated into closing the gender gap that still exists in science occupations. Could a better societal support system help to maintain these beliefs and consequently encourage more women to pursue these male dominated careers? While it does not appear that young women with identified natural mentors hold any statistically significant attitudes than young women who do not identify mentors on these issues, contrived

mentors might make the difference, particularly if the mentors were women who had careers in the sciences and who would encourage the young women to pursue similar paths.

Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their attitudes towards mentors?

Participants in the study were asked if having a role model or mentor would help them in attaining their career goals. As one might expect, those students who identified a mentor in their life were more likely to agree with this statement.

Table 34

Question 28 – "Having a mentor or role model would help me in attaining my career goals" by Identification of a Mentor (N = 69)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Mentor	25	46.3%	25	46.3%	4	7.4%	0	0%
No Mentor	1	6.7%	6	40.0%	5	33.3%	3	20.0%

Note: $X^2 = 21.85$, $p > .05$

There was no significant difference between the responses of the two groups.

Are there significant differences among the perceptions of females in levels I, II and III enrolled in science courses in an urban high school in their attitudes towards schools encouraging mentoring?

This study sought to find out more about females' attitudes towards mentors, and particularly if they thought schools should encourage mentoring. Item 39d on the questionnaire asked the students to respond "yes" or "no" to the statement, "Schools should encourage mentoring for students". Table 35 summarizes the responses of the females in the study.

Table 35
Question 39d – "Schools should encourage mentoring for students"
(N = 70)

Grade	Yes		No	
	Freq.	%	Freq.	%
Level I	21	95.5%	1	4.5%
Level II	18	81.8%	4	18.2%
Level III	20	80.0%	5	20.0%

Note: $X^2 = 2.61$, $p > .05$

This question was also analyzed with respect to those students who identified mentors versus those who did not. Table 36 summarizes that analysis.

Table 36
Question 39d – "Schools should encourage mentoring for students"
(N = 70)

Grade	Yes		No	
	Freq.	%	Freq.	%
Mentor	51	92.7%	4	7.3%
No Mentor	8	57.1%	6	42.9%

Note: $X^2 = 2.61$, $p > .05$

While more students who have a mentor in their life agree with this statement, there is no significant difference in the responses between the two groups at the .05 level.

Conclusion

The data presented in this chapter gives an indication of the feelings and attitudes that the young women in the study held towards science, future occupations and the influence of mentors in their lives. As a group, the young women in the study indicated that they planned to further their studies after high school and many seemed open to exploring the option of careers in science. Their responses indicated that they were confident in their abilities and content with themselves. While there were no statistically

significant differences between grade level or between the mentor and non-mentor groups for any of the factors, the majority of the students supported the notion of mentoring and felt it had merit.

In chapter five, the results of this study will be discussed further. The data will be summarized in relation to the research questions posed and compared to related literature.

Chapter 5

Introduction

This study examined the influence of mentoring on adolescent females, explored the attitudes that adolescent females have towards science, and examined the occupational plans of adolescent females enrolled in levels I, II and III in an urban high school in Newfoundland. Guided by 11 research questions, a questionnaire was developed and administered to students attending an urban high school in Newfoundland. Data analyses were performed on the responses, comparing them between grade levels and between the group of students who identified the presence of a mentor in their lives and the group who identified no mentor. The results have been reported correspondingly and may be found in chapter four.

This chapter is organized into three sections. The first section furnishes a summary and discussion of each research question as applied to the data. The second section provides some conclusions, and the third section outlines some recommendations.

Summary and Discussion

As girls transition into adulthood, they face many challenges and make many discoveries. Young women begin to make critical decisions that will affect their future careers. One of the purposes of this research was to determine if mentors influence the career decisions of young women at this pivotal time in their lives. This research also

explored the attitudes and expectations of young women with respect to science and science-related occupations.

Data were collected from questionnaires administered to females in Level I, II and III in an urban high school in Newfoundland. One hundred and twenty-one questionnaires were distributed and a total of 75 questionnaires were returned. Five level IV students completed and returned questionnaires; however, these are not included in the analysis. The level IV responses were disregarded because of the low number of responses in comparison to the other grades and because this researcher chose to focus on the traditional three levels of high school. Statistical analyses were then performed on the data including multiple responses, correlational analysis and t-tests. The results of this investigation revealed many things about these young women.

The analysis of the data demonstrated that the group of young women who were studied were an academically capable group of young women who had successfully completed many of the erudite high school science courses. The majority of the young women felt that they were good at science and confident that they would do well in their science courses. Most felt that their abilities in the sciences were respected by their teachers, and by their peers, both male and female. When comparing themselves to their male counterparts, the young women believed that they performed equally well in the sciences. Their responses also indicated that the plurality of young women studied believed that science was an important subject to study. These findings indicate that the majority of the females studied held positive attitudes towards science and their own abilities in the sciences. Furthermore, the young women felt confident when voicing

their opinions and believed that they made important contributions at school. The majority reported feeling happy most of the time and felt good about themselves.

Research Question #1:
Are there significant differences among Level I, II and III females enrolled in Science courses at an urban high school in their attitudes towards science?

The majority of the young women felt that they were good at science and confident that they would do well in their courses. Most of the young women surveyed felt that science was an important subject to study. These findings indicated that the majority of females studied held positive attitudes towards science and their own abilities in the sciences. These findings were contradictory to those of Evans, Whigham and Wang (1995) who found that many school-aged females held negative attitudes towards the study of science. There was no significant difference among Level I, II and III students in their attitudes towards science.

Research Question #2:
Are there significant differences among Level I, II and III females enrolled in Science courses at an urban high school as per students' plans to pursue an occupation in science or a science related field?

Approximately half of the young women surveyed indicated that they were considering an occupation in the sciences. There was no significant difference across

grade levels in the response. This finding indicates that interest in, and desire to pursue an occupation in science does not wane as students progress through high school.

It would be interesting to follow these females to determine if like the young women in a study by Farmer, Wardrop, Anderson and Risinger (1995), those with higher grade point averages and higher socio-economic status persisted in pursuing occupations in science. Baker and Leary (1995) found that girls who saw science occupations as a way of connecting with others were more likely to pursue such occupations. It is impossible to say from the data collected in this study if that is the motivation for the young women who indicated that they planned to pursue an occupation in science.

Research Question #3:
Are there significant differences among the females in urban high schools who identify mentors in their lives and those who do not identify mentors as per their attitudes towards self in the present?

The plurality of young women in this study reported feeling happy most of the time and feeling good about themselves. They felt confident when voicing their opinions and believed that they made important contributions at school. The data from this study attested to the positive self-concept of the young women and the confidence they had in their abilities. There were no significant differences among the females who identified mentors in their lives and those who did not as per their attitudes towards self in the present. Eighty percent of all the young women in the study reported having good self-esteem. Seventy-five percent of the young women in the study identified the presence of

mentors in their lives. These positive findings were true for the young women with mentors as well as those without. Brown and Gilligan (1992) found that young women who had good self-esteem and a strong sense of self were better able to cope with the conflicts they faced and were stronger when standing up for what they believed in.

Research Question #4:
Are there significant differences among the females in urban high schools who identify mentors in their lives and those who do not identify mentors as per their attitudes towards self in the future?

Most of the young women surveyed believed that their future choice to have a family would not interfere with their choice to continue their career, and almost all students believed that they could have an occupation in science and have a family. Again, there was no significant difference between the group with identified mentors and those without mentors regarding their attitudes towards self in the future.

Research Question #5:
Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their self-esteem?

Seventy-five percent of the young women who participated in the study identified a mentor or mentors in their lives. Sullivan (1996) and Rhodes and Davis (1996) suggested that girls who had access to a mentor were better equipped to handle stress and overcome adversity in their lives, thus enabling young women to gain perspective and

maintain a positive self-image. The analysis of this study found no significant difference between the females with mentors and those without mentors with respect to their self-esteem. Eighty percent of all the young women in the study agreed with the statement, "I have good self-esteem". These findings do not support those of Sullivan or Rhodes and Davis. The majority of the young women in the present study also reported being happy most of the time and liking who they were. These positive findings were true for both young women who identified mentors in their lives and those who did not.

The vast majority of females in the study agreed that they were happy most of the time and liked who they were. The strong agreements with these statements indicate that the young women had good self-esteem but that the lack of a mentor in one's life did not have a significantly negative impact on self-esteem.

Research Question #6:
Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their plans to pursue an occupation in science?

Approximately half of the young women surveyed indicated that they were considering an occupation in the sciences. Of this group, roughly 30% felt that a significant woman in their lives had influenced this consideration of an occupation in science. Forty-one percent of all students surveyed reported that they had been encouraged by an adult to pursue an occupation in science or a science-related field. While there was no significant difference between the groups with and without mentors,

these numbers do suggest that adults do have an influence on the career decision-making process.

Research by Baker and Leary (1995) and Marlow and Marlow (1996) indicated that mentors could have a positive impact on encouraging girls to consider science-related occupations. The findings of this study did not support that supposition. In this research, there was no significant difference between the young women who identified a mentor in their lives versus those who did not with respect to their consideration of an occupation in science.

Research Question #7:
Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their attitudes towards science?

These findings appeared to be very positive and did not give any indication that the females viewed science as being male dominated, cold or not enjoyable, as suggested by Baker and Leary (1995). Baker and Leary (1995) and Betz (1997) proposed that as girls grow up, they lose their confidence in their ability to perform in science. The data from this study did not support that notion. The responses of the majority of the young women in this study attested to their positive self-concept and confidence in their abilities. The majority of the young women who were surveyed believed that they were good at science, that science was important to study and that they would do well in science. There was no significant difference between the mentor and non-mentor groups for this data.

Research Question #8:
Are there significant differences among urban high school females who identify mentors in their lives and those who do not identify mentors as per their plans regarding career and family?

The young women in the study indicated that their choice to have a family would not interfere with their choice to continue their career, and almost all students believed that women could have an occupation in science and have a family. These young women believed that attaining a balance between family and career was possible. The numbers of young women who agreed with having a career and family was consistent with Astin's (1990) findings that 75% of female college students believed they would work and have a family, with 20% continuing to work following the birth of children. The results of this study indicated that the young women believed, as asserted by Schreiber (1988), that they would be able to strike a balance between the two domains of career and family.

Research Question #9:
Are there significant differences among the perceptions of females in Levels I, II and III enrolled in science courses in urban high schools on the importance of the role of mentors in influencing career plans/aspirations?

While there was no significant difference among grade levels, the younger students appeared to be more likely to have their career decisions influenced by significant adults in their lives than did the older students. It is possible that while young

women mature, they think and act more independently and are therefore less influenced by the adults in their lives. The majority of level I and II students believed that adults in their lives had influenced their career decisions, while the level three group were split in their responses.

While an average of 63.6% of the students acknowledged that significant adults in their lives have influenced their career decisions, only 41% had been encouraged by an adult to pursue an occupation in a science or science-related field. This apparent lack of support and encouragement may be contributing to the problem of under-representation of women in science occupations. Dick and Rallis (1991) found that students were more likely to pursue careers in science if they had been encouraged to do so by a significant adult in their life.

Research Question #10:
Are there significant differences among the perceptions of females in Levels I, II and III enrolled in science courses in urban high schools in their attitudes towards schools encouraging mentoring?

Eighty-five percent of the young women who responded to the survey believed that schools should encourage mentoring for students. This finding demonstrated that the young women were of the opinion that mentoring had value. The young women acknowledged that significant adults in their lives could have an impact on aspects of their development and that mentoring should be offered to students.

Research Question #11:
Are there significant differences among Level I, II and III students enrolled in science courses in urban high school as per their beliefs about women in science occupations?

Most of the young women surveyed believed that women could access occupations in science and that these occupations would not be more difficult for women than for men. As well, both the mentor and non-mentor groups believed that occupations in science were accessible to women. The majority of both groups disagreed that occupations in science were more difficult for women than men or that there were more barriers for women pursuing science occupations than there were for men. All of the young women surveyed believed that women could succeed in occupations in science and almost all agreed that a career in science and a family were attainable. These findings supported those of Sheppard (1999) in her evaluation of young women in a science and engineering summer program. This data strongly suggested that the group of young women who participated in the research held positive attitudes toward women in science.

Conclusions

The results of this research provided insight into the attitudes of young women towards self, science, careers and the role of mentors in their lives. The attitudes of these young women were very encouraging. They were positive about women's ability to succeed in science and about their futures. Their experiences have shown them that

occupations in science are options for women and in particular, for many of them. These young women have also strongly indicated that significant adults in their lives play an important role in influencing their career decisions.

For all of the areas explored, beliefs about science, occupations in science, women in science, self-esteem, plans for the future and mentoring, there was no significant difference between the group who identified the presence of a mentor(s) in their life and those who did not. This can be interpreted as a positive finding. Because these mentors were naturally occurring, the young women who did not feel that they had access to this type of support were not at a greater disadvantage for these factors. The young women did, however, strongly support the notion of mentoring. They acknowledged that significant adults could have an impact on their lives, particularly on their career decisions, and that mentoring should be offered to students.

This study only surfaced the work needed to understand the complex problem of gender equity in the sciences. The young women in this study seemed to have strong voices on the topics posed to them and so far have demonstrated a healthy resistance to the pitfalls that have been the societal norm in women's career development in the sciences. The voices of young women are worth listening to as they help us to understand the psychological development of women. We need to find out more about what interests girls in science and what works to maintain that interest and perhaps more importantly, what factors maintain young women's confidence in their abilities in science and in pursuing related careers.

Recommendations for Practice

1. It is recommended that parents be informed of the affect they have on the career development of their children. Parents need to be exposed to instruction and educational material that suggest ways to encourage their daughters to develop to their full capacity.

2. It is recommended that counsellors provide career education addressing the concerns and doubts that young women have concerning math and science related careers.

3. It is recommended that schools identify role models and mentors in their community who are willing to share their experiences with young women.

Recommendations for Future Research

1. A longitudinal study of young women who identify and relate to non-formal and/or formal mentors and a group who do not would provide insight into the long-term effects of mentorship. It could attempt to identify whether or not mentoring relationships translate into the consideration of a wider range of career options for women. In particular, such a study might examine if women who have mentors are more likely to enter non-traditional career areas.

2. A meta-analysis of existing mentoring programs for women, such as Women in Science and Engineering summer program and the Y Enterprise program for women, might give an indication whether or not formal mentoring programs make a difference in the career progress of women and in particular whether or not they impact women's entry into non-traditional occupations.

3. More study needs to be done on how relationships and affective dimensions affect girls' career choices. Are girls who place strong emphasis on relationships with others as likely to enter careers related to science and math as those girls who do not?

4. A qualitative study of young women and their attitudes toward careers in science would help further identify the pathway of women's career development and explore the factors affecting their decisions.

5. Extensive research is needed to determine the development of the self-concept and the factors that influence its maturation in women. To what degree do the home, school and the community influence the development of the self-concept?

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APPENDIX A

Questionnaire

The following questionnaire was developed for the purpose of gathering data to help determine how young women feel about Science, future occupations and the influence of mentors/role models in their lives. This information could be helpful in addressing the needs of young women in the future.

The information gathered from this questionnaire will be used for research purposes only. Strict confidentiality and anonymity will be maintained. The data will be summarized in the author's thesis.

Please answer all questions on the answer sheet that is provided with this questionnaire. Filling out this questionnaire is voluntary and thus, students have the option to omit any questions they choose.

I would like to take this opportunity to thank you for filling out this questionnaire. Enjoy your summer!

Jill E. Kelly

Graduate Student
Department of Education

1. What is your current age?

(a) 15 _____
(b) 16 _____
(c) 17 _____
(d) 18 _____
(e) 19 _____

2. What is your current grade?

(a) Level I _____
(b) Level II _____
(c) Level III _____
(d) Level IV _____

3. Indicate the number of Science courses you have taken in high school:

(a) 1 – 2 _____
(b) 3 – 4 _____
(c) 5 – 6 _____
(d) more than 6 _____

4. Indicate which of the following Science courses you have taken (check all that apply) and your approximate mark.

Course		Grade	Course		Grade
Biology 2201	_____	_____	Biology 3201	_____	_____
Chem. 2202	_____	_____	Chem. 3202	_____	_____
Physics 2204	_____	_____	Physics 3204	_____	_____
Gen. Sc. 1200	_____	_____	Envir. Sc.3205	_____	_____
Eth. Sys. 3209	_____	_____	AP Bio. 4220	_____	_____
AP Phy. 4222	_____	_____	AP Chem. 4222	_____	_____
Other	_____	_____	Other	_____	_____
Other	_____	_____	Other	_____	_____

5.(a) In the last year or two, what work did your parents/guardians do? (Please circle the appropriate number(s).

	Father	Mother
Deceased	1	1
Worked full-time	2	2
Worked part-time	3	3
Homemaker	4	4
Was unemployed	5	5

(b) When employed, what was your father/guardian's main occupation?

_____

(c) When employed, what was your mother/guardian's main occupation?

_____

Often, significant people in your life can have a positive influence on the goals you set and the decisions you make. People who provide you with information, advice and emotional support are often called **mentors.** Mentors are often older than you and are people that you have known and counted on for a period of time. With this in mind, please complete the following chart.

6.(a) I have a special mentor(s) in my life. YES _____ NO _____

(If you answered NO, go to question #7)

(b). Indicate with a check ( ) all of your mentors.

Relatives		Non-Relatives	
Mother	_____	Male Teacher	_____
Father	_____	Female Teacher	_____
Sister	_____	Guidance Counsellor	_____
Brother	_____	Coach	_____
Aunt	_____	Friend	_____
Uncle	_____	Neighbor	_____
Cousin	_____	Other (specify)	_____
Other (specify)	_____	Other (specify)	_____
Other (specify)	_____	Other (specify)	_____

(d) Of those mentors you have identified, indicate those who have influenced your career plans/goals with an 'X'on the list below.

Relatives		Non-Relatives	
Mother	_____	Male Teacher	_____
Father	_____	Female Teacher	_____
Sister	_____	Guidance Counsellor	_____
Brother	_____	Coach	_____
Aunt	_____	Friend	_____
Uncle	_____	Neighbor	_____
Cousin	_____	Other (specify)	_____
Other (specify)_____		Other (specify)	_____
Other (specify)_____		Other (specify)	_____

On a scale of 1 to 5 rate the degree to which you agree or disagree with each of the following statements. Circle the response that best applies.

1 Strongly Agree	**2 Agree**	**3 Disagree**	**4 Strongly Disagree**	**5 Not Applicable**

7.	I am interested in Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
8.	I plan to study Science or Science related areas in college.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable

9.	I plan to study Science or Science related areas in university.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
10.	I am good at Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
11.	I enjoy studying Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
12.	I believe Science is an important subject to study.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
13.	I feel confident that I will do well in Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
14.	Males and Females perform equally well in Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
15.	I am considering pursuing a career in Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
16.	If I agree with #15, my decision to pursue an occupation in Science has been influenced by a significant woman in my life.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
17.	Occupations in Science are accessible to women.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
18.	Occupations in Science are more difficult for women than men.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
19.	There are more barriers for women pursuing Science occupations then there are for men.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
20.	Women can succeed in occupations in Science.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
21.	Women can have an occupation in Science and have a family.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
22.	An occupation in Science is possible for me.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable

23.	I feel confident that I can reach my career goals.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
24.	I will likely graduate from college.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
25.	I will likely graduate from university.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
26.	Having a successful career is important to me.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
27.	If I choose to have a family, I will continue to also maintain my career.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
28.	Having a mentor or role model would help me in attaining my career goals.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
29.	Mentors play an important role in my life.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
30.	I am confident when voicing my opinions.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
31.	I feel that my abilities in the Sciences are respected by my female peers.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
32.	I feel that my abilities in the Sciences are respected by my male peers.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
33.	I feel that my abilities in the Sciences are respected by my teachers.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
34.	I believe I make important contributions at school.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
35.	I am happy most of the time.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
36.	I have good self-esteem.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable
37.	I like who I am.	1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree	5 Not Applicable

38. What type of career would you like to have in the future?

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39. Answer **Yes** or **No** to each question below. Please circle the appropriate answer.

(a)	Significant adults in my life have influenced my career decisions.	YES	NO
(b)	I have been encouraged by one (or more) adults to pursue an occupation in a Science or in a Science-related field.	YES	NO
(c)	I know a woman (or women) who has an occupation in Science.	YES	NO
(d)	Schools should encourage mentoring for students.	YES	NO

Thank you for taking the time to complete this survey.

APPENDIX B

Letters to Directors of Education

To Whom It May Concern:

I am a graduate student at Memorial University, currently conducting research for my thesis. My area of research involves examining the role of mentors in the lives of young women and the possible effect mentors have on encouraging young women to pursue careers in science.

I am interested in distributing a questionnaire to young women enrolled in high school science courses. The questionnaire asks the young women about the presence of mentors in their lives and the influence that any mentors have had on their career plans. My questionnaire also examines the interest these young women have in studying science and pursuing occupations in science.

I would like permission to distribute this questionnaire to young women in your school. This process would be facilitated through the science teachers, with their permission. Students who participate will be provided with an information letter explaining the purpose of the study and the terms of their participation. Participation is voluntary. All information gathered in this study is strictly confidential and at no time will individuals be identified. This study has received the approval of the Faculty of Education's Ethics Review Committee and its results will be made available to you upon request.

If you have any questions or concerns or would like more information on the questionnaire or my study, please feel free to contact Dr. Mildred Cahill (737-7026), my thesis supervisor, or myself. If at any time you wish to speak with a resource person not associated with the study, please contact Dr. Bruce Sheppard, Associate Dean, Graduate Programmes and Research at 737-3402.

Attached, please find a consent form that is required from the school if you agree for the school to participate in my study. I have also attached a copy of the proposed questionnaire and the letter for parents of participants.

Sincerely Yours,

Jill E. Kelly

I _____ give permission for the school _____ to participate
Principal/Vice-Principal — School's Name

in the proposed study. All information is strictly confidential and no individual will be identified.

_____ _____
Date — Signature of Principal/Vice-Principal

APPENDIX C

Permission Forms

Dear Parent or Guardian:

I am a graduate student in the Faculty of Education at Memorial University, under the supervision of Dr. Mildred Cahill. I am requesting permission to have female students enrolled in Science courses at _____ High School complete a questionnaire. This questionnaire examines females' attitudes towards their future careers, science and the presence and influence of mentors in their lives. I am requesting your permission for your child to take part in this study.

Your child's participation will involve completing a questionnaire, consisting of approximately 45 questions. This will take about 10 minutes.

All information gathered in this study is strictly confidential and at no time will individuals be identified. Participation in this study is voluntary and you or your child may withdraw permission at any time. Your child may decline to answer any individual questions or refuse the questionnaire at any time. This study has received the approval of the Faculty of Education's Ethics Review Committee. The results of my research will be make available to you upon request.

If you are in agreement with having your child participate in this study, please sign below and return one copy to the school. The other is for you. If you have any questions or concerns, please do not hesitate to contact me at 579-6465. If at any time you wish to speak with a resource person not associated with the study, please contact Dr. Bruce Sheppard, Associate Dean, Graduate Programmes and Research.

I would appreciate it if you would please return this sheet to me by _____.

Yours Sincerely,

Jill Kelly

I _____ (parent/guardian) hereby give permission for my child to take part in a study by Jill Kelly that examines the influence of mentorship on young women's career aspirations and attitudes towards Science. I understand that participation is entirely voluntary and that my child and/or I can withdraw permission at any time. All information is strictly confidential and no individual will be identified.

_____ _____

Date Signature of Parent/Guardian

Dear Student:

I am a graduate student in the Faculty of Education at Memorial University under the supervision of Dr. Mildred Cahill. I am requesting permission to have female students enrolled in Science courses at _____ High School complete a questionnaire. This questionnaire examines females' attitudes towards their future careers, science and the presence of mentors in their lives. I am requesting that you take part in this study.

Your participation will involve completing a questionnaire consisting of approximately 45 questions. This will take about 10 minutes.

All information gathered in this study is strictly confidential and at no time will individuals be identified. Participation in this study is voluntary and you may withdraw permission at any time. You may decline to answer any individual questions or refuse the questionnaire at any time. This study has received the approval of the Faculty of Education's Ethics Review Committee. The results of my research will be make available to you upon request.

If you are in agreement with participating in this study, please sign below and return one copy to the school. The other is for you. If you have any questions or concerns, please do not hesitate to contact me at 579-6465. If at any time you wish to speak with a resource person not associated with the study, please contact Dr. Bruce Sheppard, Associate Dean, Graduate Programmes and Research.

I would appreciate it if you would please return this sheet to me by _____.

Yours Sincerely,

Jill Kelly

I _____ agree to take part in a study by Jill Kelly. This study examines the influence of mentorship on young women's career aspirations and attitudes towards Science. I understand that participation is entirely voluntary and that I can withdraw permission at any time. All information is strictly confidential and no individual will be identified.

_____ _____

Date Signature of Participant